1-6-8

~~615~~
201

DANA

MODELS 20 & 25

A. C. CONVERTER

MARCH 1967

INSTRUCTION MANUAL

980221

DANA™

Dana Laboratories Incorporated
Irvine, California 92664

Telephone (714) 833-1234
Teletype 910-595-1136

MODELS 20 AND 25 AC/DC CONVERTERS

1.0 GENERAL DESCRIPTION

Dana Model 20 and 25 AC Converters allow AC voltages to be measured by 5600 Series Dana Voltmeters using the regular input leads of the meter. The converter is mounted on a plug-in circuit board that is installed within the Digital Voltmeter. It receives its power voltages from the Digital Voltmeters. Model 20 and Model 25 are nearly identical except for operating frequency range. Model 20 operates at frequencies to 20,000 Hz while Model 25 operates up to 100,000 Hz.

2.0 SPECIFICATIONS

The following specifications refer to the Digital Voltmeter output as a function of the AC input.

Frequency Range	
Model 20	50 Hz to 20,000 Hz
Model 25	50 Hz to 100,000 Hz
Maximum voltage:	500 volts RMS, 50 Hz to 10 Hz decreasing to 150 v at 50 kHz and above
Full scale ranges:	0.99999, 9.9999, 99.999, 999.99 v rms
Accuracy	
Model 20	±0.1% of reading or ±0.02% of f.s., 50 Hz to 10kHz; ±0.25% of reading or ±0.03% of f.s., 10 kHz to 20 kHz.
Model 25	±0.1% of reading or ±0.02% of f.s., 50 Hz to 10 kHz; ±0.25% of reading or ±0.05% of f.s., 10 kHz to 50 kHz; ±0.5% of reading or ±0.1% of f.s., 50 kHz to 100 kHz.
Response Time	
Step response:	0.4 second to within 0.1% of final value
Response time with range change:	1.6 seconds
Input Characteristics	
Input resistance; Shunt capacitance(exclusive of external cable):	1 megohm in series with 0.22 ufd, all ranges <200 pf
Calibration	RMS for sine wave input; 1.11 times full wave average magnitude for other wave forms.
Dana Certification:	Sine wave
Range Control:	Automatic with manual override selected by DVM front panel control
Typical Accuracy:	50 - 50 kHz: 1% of reading or 0.2% of range, whichever is greater

SPECIFICATIONS (Cont)

Decimal Point Indication	Automatic
Isolation	AC input is isolated and guarded from ground, the AC power line, electrical output.

3.0 OPERATIONAL DESCRIPTION

A simplified diagram of the AC Converter is shown in Figure 1. It is made up of a preamplifier, an operational rectifier, and an active filter. The gain of the preamplifier is changed with each range selection by varying the value of the feedback resistor. Preamp gains for each range are listed below:

1 volt range, gain = 3
10 volt range, gain = 0.3
100 volt range, gain = 0.03
1000 volt range, gain = 0.003

The value of the feedback resistance, R_{fb}, is switched by the range signals, R1 and R2, generated within the voltmeter by a manual range selection or by the Auto Range circuits.

The conversion from AC to DC takes place in the operational rectifier which receives the preamp output and delivers a pulsating DC. This circuit is a unity-gain operational amplifier having polarity sensitive feedback paths. Its output is applied to the active filter circuit which has a gain of 3.33.

The output of the AC Converter represents the rms value of the AC input. This is shown by assuming an input of 28 volts, peak-to-peak which is approximately 10 volts rms. On the ten-volt range, the preamp delivers approximately 8.4 volts, peak-to-peak, to the operational rectifier. The operational rectifier applies half-wave signals of opposite polarity to the differential input of the active filter. Each half-wave signal is 4.2 volts, peak, or about 3.0 volts rms which, amplified by 3.33 by the active filter, results in ten volts DC output.

4.0 OPERATION

The AC Converter is connected into the circuit when the MODE switch on the voltmeter is set to AC. The range switch may be set to any of the fixed ranges or to AUTO. For most measurements, the MODE switch should be set to TRACKING.

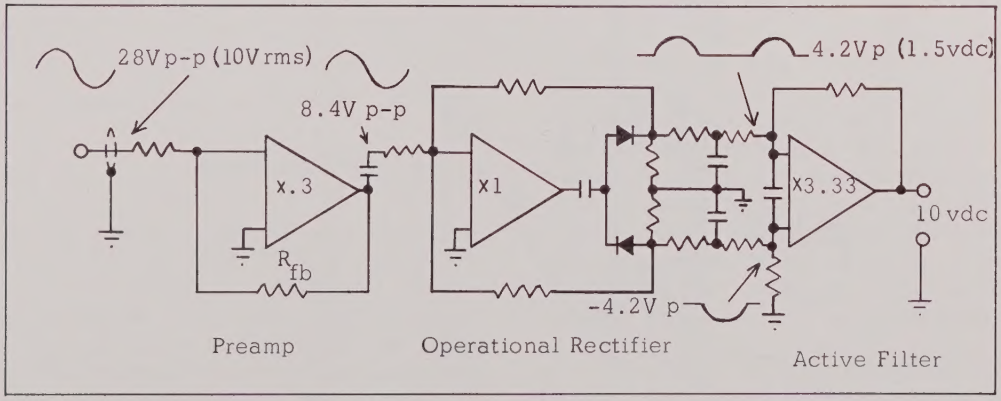


Figure 1. Simplified Diagram - AC Converter

This allows the instrument to track any significant change in voltage with new readings taken as often as five times per second. When the Tracking Mode is selected and a range change occurs (when in Auto Range) an internal delay allows the AC Converter to settle to full accuracy before a new reading is taken.

Much greater stability at all frequencies, especially lower frequencies, can be obtained by using the internal Digital Voltmeter filter. This operation requires a slightly longer settling and range change time.

5.0 CALIBRATION PROCEDURE

5.1 Equipment Required:

AC Signal source, 50 Hz to 100 kHz, 0-500.00 volts RMS with less than 0.03% distortion.

Dana DVM extender assembly and converter input extender cable (supplied with AC Calibration Kit 400919).

5.2 General

There are nine adjustments on the Model 20 and 25 Converters. One unmarked potentiometer (top of unit nearest the rear) is to adjust for zero output with the input shorted. The remaining eight adjustments are to calibrate the four ranges. Each range has a potentiometer to calibrate at low frequencies and a trim capacitor for high frequency calibration. The eight calibration adjustments are clearly marked immediately adjacent to each control. It is important that calibration be performed in the sequence listed.

5.3 Procedures (Figure 2)

(a) With the DVM power OFF, insert the converter with extender card, support bracket, and extender cable into the DVM.

(b) Turn the power on and allow the voltmeter to warm up 30 minutes.

5.3.1 Zero Adjustment

(a) Place the FUNCTION switch to AC, RANGE to 100, and MODE to PERIODIC.

(b) Short the input to the DVM. Adjust the zero potentiometer clockwise until an offset is observed. Reverse the adjustment to the point of zero display.

> NOTE: After each range is calibrated, it should be checked for proper response. Suggested points are:
>
> Model 20 - ±0.1% at 50 Hz, 400 Hz, 1 kHz, 5 kHz, and 10 kHz or ±0.02% of full scale; ±0.25 at 20 kHz or ±0.03% of full scale.
>
> Model 25 - ±0.1% at 50 Hz, 400 kHz, 1 kHz, 5 kHz, and 10 kHz or ±0.02% of full scale; ±0.25% at 25 kHz and 50 kHz or ±0.05% of full scale; ±0.5% at 100 kHz or ±0.1% of full scale.

5.3.2 1000 Volt Range

Set the DVM to its 1000 v range. Set the AC source to 500 volts at 400 Hz and adjust the 1000 volt potentiometer for minimum error. Set the AC source to 125 volts at *50 kHz and adjust the 1000 v trim capacitor for minimum error. Repeat these two steps as required, being careful to check the *50 kHz calibration last.

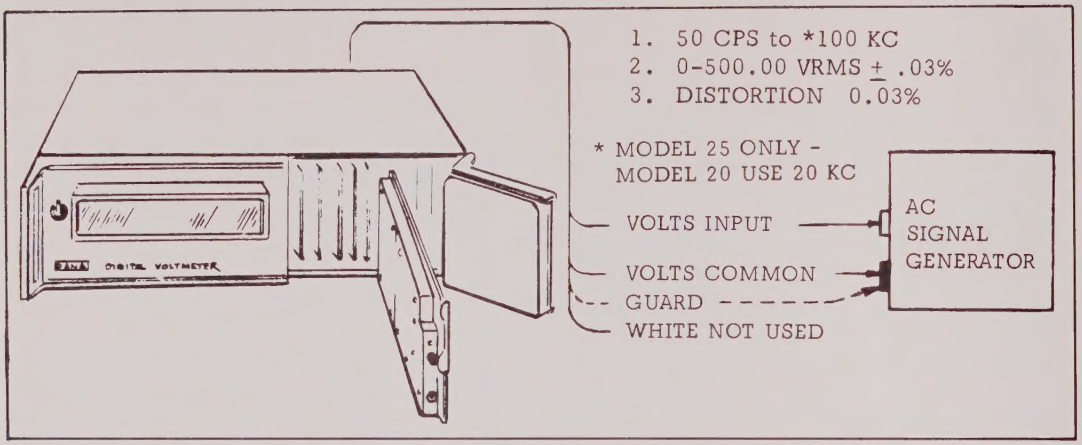


Figure 2. Calibration Setup

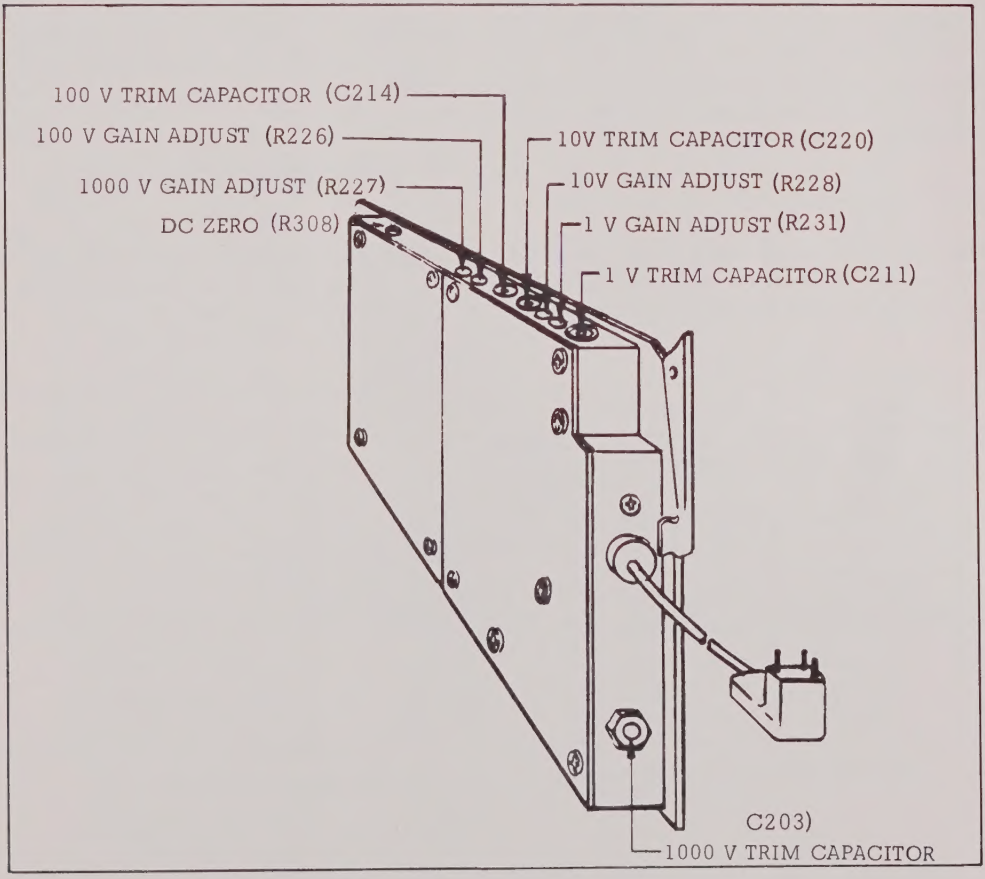

100 V TRIM CAPACITOR (C214)
100 V GAIN ADJUST (R226)
1000 V GAIN ADJUST (R227)
DC ZERO (R308)
10V TRIM CAPACITOR (C220)
10V GAIN ADJUST (R228)
1 V GAIN ADJUST (R231)
1 V TRIM CAPACITOR (C211)
C203)
1000 V TRIM CAPACITOR

Figure 3. Adjustment Locations

5.3.3 100 Volt Range

Set the DVM to the 100 v range. Set the AC source to 99 volts at 400 Hz and adjust the 100 volt potentiometer for minimum error. Set the AC source to 99 volts at *50 kHz and adjust the 100 volt trim capacitor for minimum error. Repeat these two steps as required, checking calibration at *50 kHz last.

5.3.4 1 Volt Range

Set the DVM to the 1 v range. Set the AC source to 0.99 volts at 400 Hz and adjust the 1 volt potentiometer for minimum error. Set the AC source to 0.99 volts at *50 kHz and adjust the 1 volt capacitor for minimum error. Repeat these two steps as required, checking calibration at *50 kHz last.

5.3.5 10 Volt Range

Set the DVM to the 10 v range. Set the AC source to 9.9 volts at 400 kHz and adjust the 10 volt potentiometer for minimum error. Set the AC source to 9.9 volts at *50 kHz and adjust the 10 volt trim capacitor for minimum error. Repeat these two steps as required, checking calibration at *50 kHz last.

5.3.6 Final Check

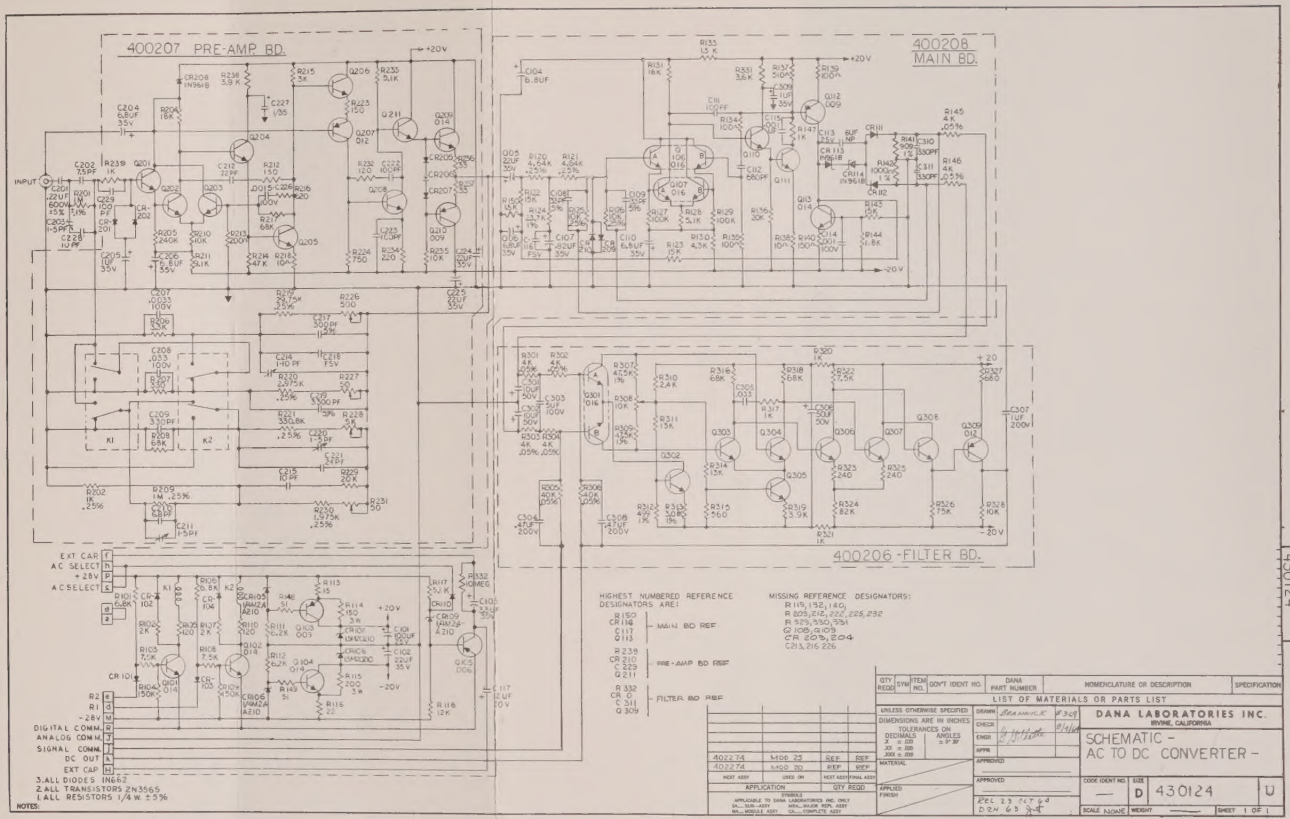
Remove the converter from the extender card and install it in its operational position. Check the accuracy of each range at several frequencies over the range of 50 Hz to *50 kHz. If any single range requires adjustment, recheck lower ranges sequentially beginning with the highest applicable range. As each range is readjusted, check calibration at *50 kHz last.

5.3.7 Summary of Adjustments

After the details of calibration are learned, the summary shown below will serve to expedite calibration.

Range	Test Voltage	Test Frequency	Adjustment
100 volt	Shorted input	-	Zero Potentiometer for zero display
1000 volt	500 volts	400 Hz	1000 v potentiometer
1000 volt	125 volts	*50 kHz	1000 trim capacitor
100 volt	99 volts	400 Hz	100 v potentiometer
100 volt	99 volts	*50 kHz	100 v trim capacitor
1 volt	0.99 volts	400 Hz	1 v potentiometer
1 volt	0.99 volts	*50 kHz	1 v trim capacitor
10 volt	9.9 volts	400 Hz	10 v potentiometer
10 volt	9.9 volts	*50 kHz	10 v trim capacitor

*For Model 25 AC Converter only - Use 10 kHz source for Model 20.



Schematic - AC/DC Converter

6.0 TROUBLESHOOTING

Operation of the Converter can be checked by applying a 28-volt (peak-to-peak) input as shown in Figure 1. If the unit does not deliver 10 volts DC, check the input to the active filter at the junction of C304 and wiring to the base of Q301 (see page 9), for approximate voltages indicated on the diagram. Next, check the output of the Preamplifier at the positive terminal of C105. In this manner, the malfunctioning stage can be isolated. Certain specific troubles are listed below:

6.1 Unit Will Not Zero

Check pot R308 on filter board assembly. If pot is good, replace transistor Q301 on same board.

6.2 Noisy

Check transistor Q201 on preamp board assembly for 1/f noise. If good, check output of active rectifier for high frequency oscillations (use a high speed scope, Tektronix Model 453 or equivalent).

6.3 Incorrect Gain on One Range

Check gain resistors on preamp board assembly for accuracy.

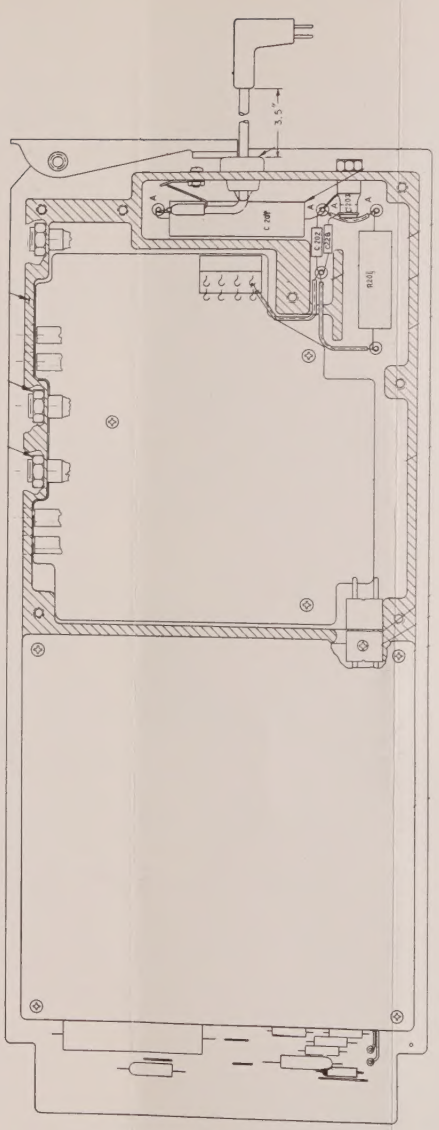
6.4 Incorrect Gain on All Ranges

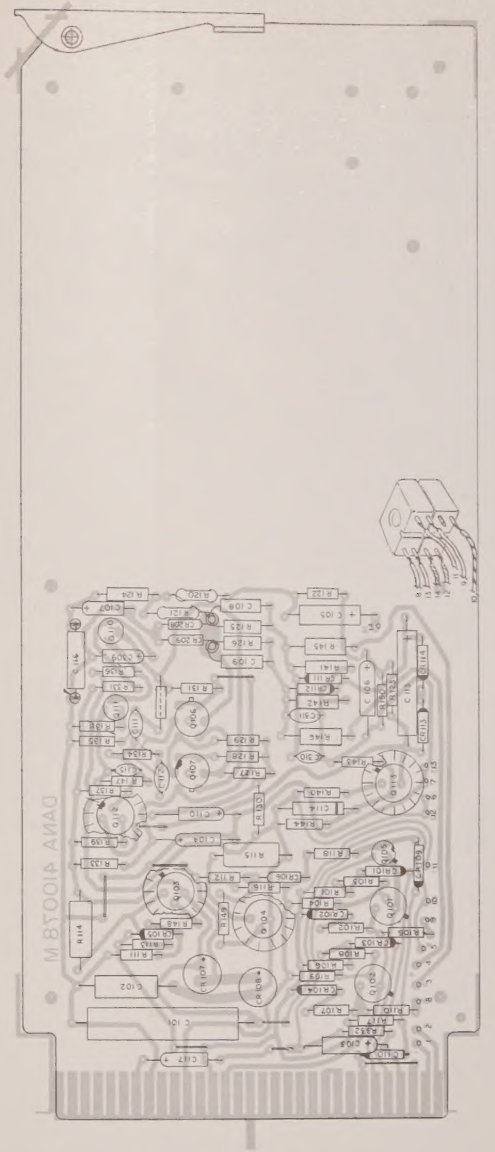
Check positive and negative power supplies (collectors of Q209 and Q10 respectively). Check each section of converter for gain accuracy. Use known AC input. See Figure 1 on page 2.

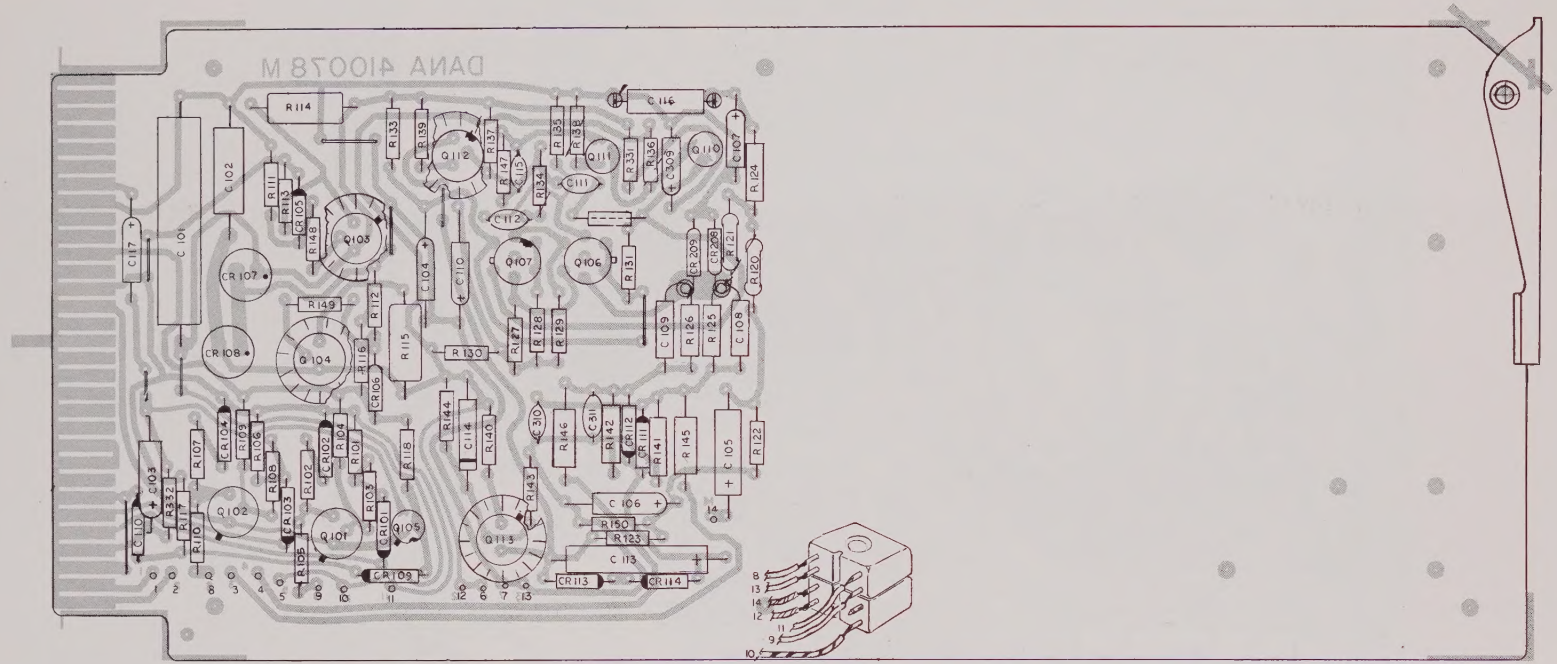
6.5 Does Not Change Range Properly

Relays and relay drivers (see truth table below). Check cable for broken wires.

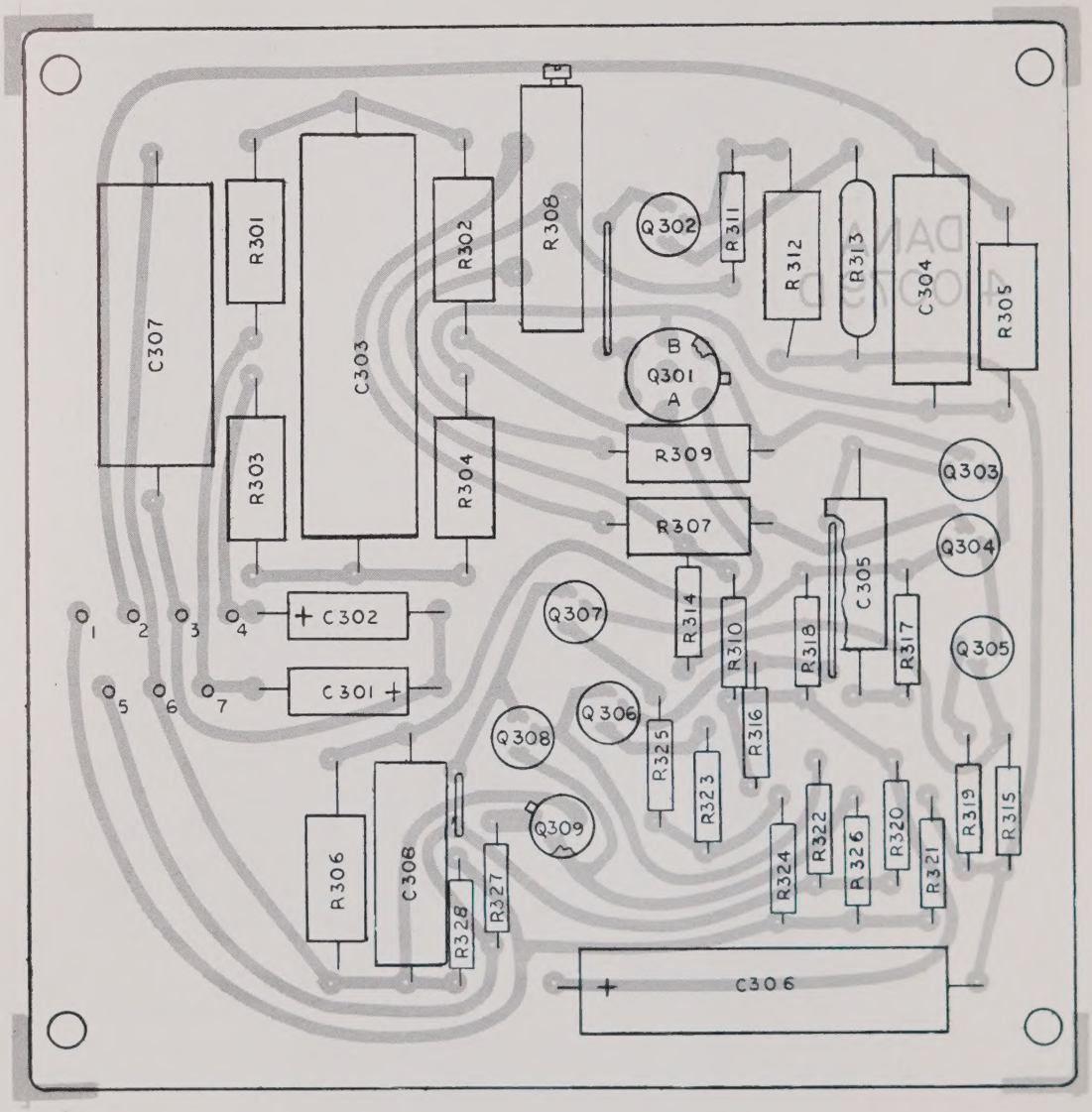
R_1	R_2	Range
K_2	K_1	
1	1	1
0	1	10
1	0	100
0	0	1000



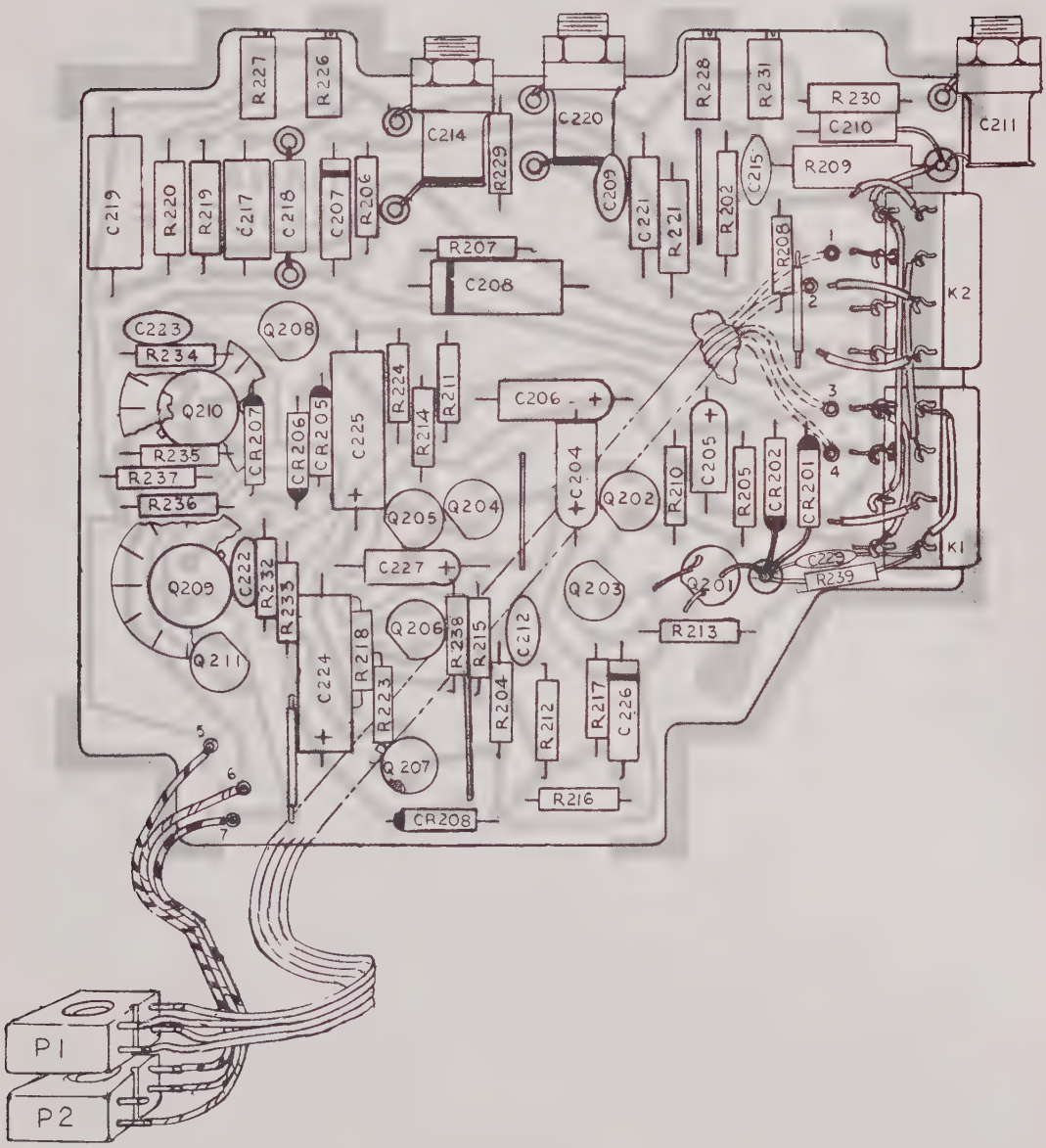




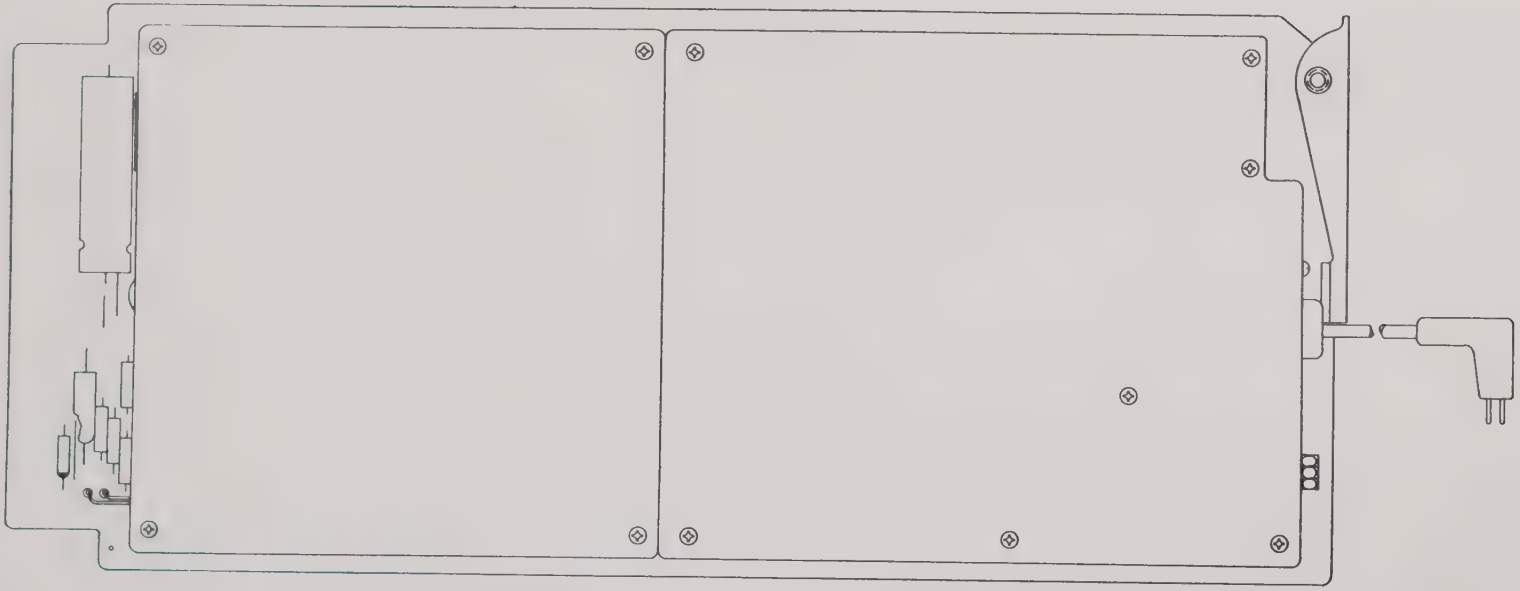
Assembly - AC/DC Converter - Main Panel



Assembly - AC/DC Converter - Filter



Assembly - AC/DC Converter - Preamp



Assembly - Wideband AC/DC Converter

PC BOARD ASSEMBLY AC/DC CONVERTER MAIN - 400208

P A R T S L I S T

REF DES	DANA P/N	PART	TYPE	DESCRIPTION	MANUFAC	MANUFAC P/N
C101	000106	RES	CARBON	10 M 5% 1/4 W	OHMITE	RC07GF106J
C102	110002	CAP	TANTA	22 MFD 35 V 10%	KEMET	K22C35K
C103	110022	CAP	TANTA	3.3 MFD 35 V 10%	KEMET	K33C35K
C104	110001	CAP	TANTA	6.8 MFD 35 V 10%	KEMET	K6R8C35K
C105	110002	CAP	TANTA	22 MFD 35 V 10%	KEMET	K22C35K
C106	110001	CAP	TANTA	6.8 MFD 35 V 10%	KEMET	K6R8C35K
C107	110019	CAP	TANTA	.82 MFD 35 V 10%	KEMET	KR82C35D
C108	120035	CAP	POLYS	33 PFD 500 V 5%	CRL	CPR-33J
C109	120035	CAP	POLYS	33 PFD 500 V 5%	CRL	CPR-33J
C110	110001	CAP	TANTA	6.8 MFD 35 V 10%	KEMET	K6R8C35K
C111	101145	CAP	CERAM	100 PFD 500 V 10%	AEROVOX	SCD1X5F
C112	101099	CAP	CERAM	680 PFD 500 V 10%	AEROVOX	SCD2X5F
C113	110007	CAP	TANTA	6 MFD 25 V 20%	GE	29F56664
C114	120005	CAP	MYLAR	.001 MFD 100 V 10%		WMF1D1
C115	101174	CAP	CERAM	.001 MFD 500 V 10%	AEROVOX	SCD3X5F
C116	120091					
C117	110045	CAP	TANTA	12 MFD 20 V 10%	KEMET	K12C20K
CR101	211083	DIODE	SILICO	018	DANA	211083
CR102	211083	DIODE	SILICO	018	DANA	211083
CR103	211083	DIODE	SILICO	018	DANA	211083
CR104	211083	DIODE	SILICO	018	DANA	211083
CR105	221177	DIODE	SILICO ZENER	1/4 W	MOTOROLA	M.2.4A25
CR106	221177	DIODE	SILICO ZENER	1/4 W	MOTOROLA	M.2.4A25
CR107	220004	DIODE	SILICO ZENER	1N961B	MOTOROLA	1N961B
CR108	220004	DIODE	SILICO ZENER	1N961B	MOTOROLA	1N961B
CR109	220004	DIODE	SILICO ZENER	1N961B	MOTOROLA	1N961B
CR110	211083	DIODE	SILICO	018	DANA	211083
CR111	211083	DIODE	SILICO	018	DANA	211083
CR112	211083	DIODE	SILICO	018	DANA	211083
CR208	211083	DIODE	SILICO	018	DANA	211083
CR209	211083	DIODE	SILICO	018	DANA	211083
CR113	220004	DIODE	SILICO ZENER	1N961B	MOTOROLA	1N961B
CR114	220004	DIODE	SILICO ZENER	1N961B	MOTOROLA	1N961B
Q101	200035	TRANS	SILICO NPN	014	DANA	200035
Q102	200035	TRANS	SILICO NPN	014	DANA	200035
Q103	200011	TRANS	SILICO PNP	009	DANA	200011
Q104	200035	TRANS	SILICO NPN	014	DANA	200035
Q105	201111	TRANS	GERMAN PNP	006	DANA	201111
Q106	200040	TRANS	SILICO NPN	016	DANA	200040
Q107	200040	TRANS	SILICO NPN	016	DANA	200040
Q110	200043	TRANS	SILICO NPN	2N3565	FAIRCHILD	2N3565

PC BOARD ASSEMBLY AC/DC CONVERTER MAIN - 400208

P A R T S L I S T

REF DES	DANA P/N	PART	TYPE	DESCRIPTION				MANUFAC	MANUFAC P/N
Q111	200043	TRANS	SILICO	NPN	2N3565			FAIRCHILD	2N3565
Q112	200011	TRANS	SILICO	PNP	009			DANA	200011
Q113	200035	TRANS	SILICO	NPN	014			DANA	200035
R101	000682	RES	CARBON	6.8 K	5%	1/4 W		OHMITE	RC07GF682J
R102	000202	RES	CARBON	2 K	5%	1/4 W		OHMITE	RC07GF202J
R103	000752	RES	CARBON	7.5 K	5%	1/4 W		OHMITE	RC07GF752J
R104	000154	RES	CARBON	150 K	5%	1/4 W		OHMITE	RC07GF154J
R105	000121	RES	CARBON	120 OHM	5%	1/4 W		OHMITE	RC07GF121J
R106	000682	RES	CARBON	6.8 K	5%	1/4 W		OHMITE	RC07GF682J
R107	000202	RES	CARBON	2 K	5%	1/4 W		OHMITE	RC07GF202J
R108	000154	RES	CARBON	150 K	5%	1/4 W		OHMITE	RC07GF154J
R110	000121	RES	CARBON	120 OHM	5%	1/4 W		OHMITE	RC07GF121J
R111	000622	RES	CARBON	6.2 K	5%	1/4 W		OHMITE	RC07GF622J
R112	000622	RES	CARBON	6.2 K	5%	1/4 W		OHMITE	RC07GF622J
R113	000150	RES	CARBON	15 OHM	5%	1/4 W		OHMITE	RC07GF150J
R114	030007								
R115	030008								
R116	000220	RES	CARBON	22 OHM	5%	1/4 W		OHMITE	RC07GF220J
R117	000512	RES	CARBON	5.1 K	5%	1/4 W		OHMITE	RC07GF512J
R118	000123	RES	CARBON	12 K	5%	1/4 W		OHMITE	RC07GF123J
R120	010286	RES	WW	10 K	.25%	1/4 W		PME	PME60T2
R121	010286	RES	WW	10 K	.25%	1/4 W		PME	PME60T2
R122	000153	RES	CARBON	15 K	5%	1/4 W		OHMITE	RC07GF153J
R123	000153	RES	CARBON	15 K	5%	1/4 W		OHMITE	RC07GF153J
R124	010123	RES	METAL	23.7 K	1%	1/4 W		ELECTRA	RN60D2372F
R125	010286	RES	WW	10 K	.25%	1/4 W		PME	PME60T2
R126	010286	RES	WW	10 K	.25%	1/4 W		PME	PME60T2
R127	000104	RES	CARBON	100 K	5%	1/4 W		OHMITE	RC07GF104J
R128	000153	RES	CARBON	15 K	5%	1/4 W		OHMITE	RC07GF153J
R129	000104	RES	CARBON	100 K	5%	1/4 W		OHMITE	RC07GF104J
R130	000432	RES	CARBON	4.3 K	5%	1/4 W		OHMITE	RC07GF432J
R131	000183	RES	CARBON	18 K	5%	1/4 W		OHMITE	RC07GF183J
R133	000152	RES	CARBON	1.5 K	5%	1/4 W		OHMITE	RC07GF152J
R134	000101	RES	CARBON	100 OHM	5%	1/4 W		OHMITE	RC07GF101J
R135	000101	RES	CARBON	100 OHM	5%	1/4 W		OHMITE	RC07GF101J
R136	000203	RES	CARBON	20 K	5%	1/4 W		OHMITE	RC07GF203J
R137	000511	RES	CARBON	510 OHM	5%	1/4 W		OHMITE	RC07GF511J
R138	000100	RES	CARBON	10 OHM	5%	1/4 W		OHMITE	RC07GF100J
R139	000101	RES	CARBON	100 OHM	5%	1/4 W		OHMITE	RC07GF101J
R140	000151	RES	CARBON	150 OHM	5%	1/4 W		OHMITE	RC07GF151J

PC BOARD ASSEMBLY AC/DC CONVERTER MAIN - 400208

P A R T S L I S T

REF DES	DANA P/N	PART	TYPE	DESCRIPTION	MANUFAC	MANUFAC P/N
R141	010142	RES	METAL	909 OHM 1% 1/4 W	ELECTRA	RN60D9090F
R142	011332	RES	METAL	1 K 1% 1/4 W	ELECTRA	RN60D1001F
R143	000153	RES	CARBON	15 K 5% 1/4 W	OHMITE	RCO7GF153J
R144	000182	RES	CARBON	1.8 K 5% 1/4 W	OHMITE	RCO7GF182J
R145	020038	RES	WW	4 K .05% 1/4 W	JORDAN	J-12
R146	020038	RES	WW	4 K .05% 1/4 W	JORDAN	J-12
R331	000362	RES	CARBON	3.6 K 5% 1/4 W	OHMITE	RCO7GF362J
R332	000106	RES	CARBON	10 M 5% 1/4 W	OHMITE	RCO7GF106J

PC BOARD ASSEMBLY PRE/AMP AC/DC CONVERTER - 400207

P A R T S L I S T

REF DES	DANA P/N	PART	TYPE	DESCRIPTION	MANUFAC	MANUFAC P/N
C204	110001	CAP	TANTA	6.8 MFD 35 V 10%	KEMET	K6R8C35K
C205	110017	CAP	TANTA	1 MFD 35 V 10%	KEMET	K1C35K
C206	110001	CAP	TANTA	6.8 MFD 35 V 10%	KEMET	K6R8C35K
C207	120001	CAP	MYLAR	.0033 MFD 100 V 10%	CDE	WMF1D33
C208	121091	CAP	MYLAR	.033 MFD 100 V 10%	CDE	WMF1533
C209	101098	CAP	CERAM	330 PFD 500 V 10%	AEROVOX	SCD1X5F
C210	130033	CAP	GLASS	6.8 PFD 500 V 10%	CORN	CYFN-10C6R8
C211	130029	CAP	GLASS	1-5 PFD 500 V 10%	LRC	682116
C212	100005	CAP	CERAM	22 PFD 500 V 10%	AEROVOX	TCD-N750
C214	130030	CAP	GLASS	1-10 PFD V 10%	LRC	682117
C215	100006	CAP	CERAM	10 PFD 500 V 10%	AEROVOX	TCD-N750
C217	130036	CAP	GLASS	300 PFD 300 V 10%	CORN	CYFM10C301J
C218	000FSV					
C219	130037	CAP	GLASS	3300 PFD 500 V 10%	CORN	CYFM10C332J
C220	130029	CAP	GLASS	1-5 PFD 500 V 10%	LRC	682116
C221	130035	CAP	GLASS	24 PFD 500 V 10%	CORN	CYFM10C240J
C222	101145	CAP	CERAM	100 PFD 500 V 10%	AEROVOX	SCD1X5F
C223	101145	CAP	CERAM	100 PFD 500 V 10%	AEROVOX	SCD1X5F
C224	110002	CAP	TANTA	22 MFD 35 V 10%	KEMET	K22C35K
C225	110002	CAP	TANTA	22 MFD 35 V 10%	KEMET	K22C35K
C226	121473	CAP	MYLAR	.0015 MFD 100 V 10%	CDE	WMF1S47
CR201	211083	DIODE	SILICO	018	DANA	211083
CR202	211083	DIODE	SILICO	018	DANA	211083
CR205	211083	DIODE	SILICO	018	DANA	211083
CR206	211083	DIODE	SILICO	018	DANA	211083
CR207	211083	DIODE	SILICO	018	DANA	211083
CR208	220004	DIODE	SILICO ZENER	1N961B	MOTOROLA	1N961B
Q201 THRU Q206	200043	TRANS	SILICO NPN	2N3565	FAIRCHILD	2N3565
Q207	200022	TRANS	SILICO PNP	012	DANA	200022
Q208	200043	TRANS	SILICO NPN	2N3565	FAIRCHILD	2N3565
Q209	200035	TRANS	SILICO NPN	014	DANA	200035
Q210	200011	TRANS	SILICO PNP	009	DANA	200011
Q211	200043	TRANS	SILICO NPN	2N3565	FAIRCHILD	2N3565
Q227	110017	CAP	TANTA	1 MFD 35 V 10%	KEMET	K1C35K
K1	310026	RELAY			DANA	310026
K2	310026	RELAY			DANA	310026
R202	010283					
R204	000183	RES	CARBON	18 K 5% 1/4 W	OHMITE	RC07GF183J

PC BOARD ASSEMBLY PRE/AMP AC/DC CONVERTER - 400207

P A R T S L I S T

REF DES	DANA P/N	PART	TYPE	DESCRIPTION			MANUFAC	MANUFAC P/N
R205	000244	RES	CARBON	240	K	5% 1/4 W	OHMITE	RC07GF244J
R206	000332	RES	CARBON	3.3	K	5% 1/4 W	OHMITE	RC07GF332J
R207	000331	RES	CARBON	330	OHM	5% 1/4 W	OHMITE	RC07GF331J
R208	000683	RES	CARBON	68	K	5% 1/4 W	OHMITE	RC07GF683J
R209	010283							
R210	000103	RES	CARBON	10	K	5% 1/4 W	OHMITE	RC07GF103J
R211	000912	RES	CARBON	9.1	K	5% 1/4 W	OHMITE	RC07GF912J
R212	000151	RES	CARBON	150	OHM	5% 1/4 W	OHMITE	RC07GF151J
R213	000201	RES	CARBON	200	OHM	5% 1/4 W	OHMITE	RC07GF201J
R214	000473	RES	CARBON	47	K	5% 1/4 W	OHMITE	RC07GF473J
R215	000302	RES	CARBON	3	K	5% 1/4 W	OHMITE	RC07GF302J
R216	000621	RES	CARBON	620	OHM	5% 1/4 W	OHMITE	RC07GF621J
R217	000683	RES	CARBON	68	K	5% 1/4 W	OHMITE	RC07GF683J
R218	000100	RES	CARBON	10	OHM	5% 1/4 W	OHMITE	RC07GF100J
R219	010283							
R220	010283							
R221	010283							
R223	000151	RES	CARBON	150	OHM	5% 1/4 W	OHMITE	RC07GF151J
R224	000751	RES	CARBON	750	OHM	5% 1/4 W	OHMITE	RC07GF751J
R226	040012	RES	VARI	500	OHM	10% 1 W	TECHNO	40
R227	040032	RES	VARI	50	OHM	10% 1 W	TECHNO	40
R228	040027	RES	VARI	5	K	10% 1 W	TECHNO	40
R229	000203	RES	CARBON	20	K	5% 1/4 W	OHMITE	RC07GF203J
R230	010283							
R231	040032	RES	VARI	50	OHM	10% 1 W	TECHNO	40
R232	000121	RES	CARBON	120	OHM	5% 1/4 W	OHMITE	RC07GF121J
R233	000512	RES	CARBON	5.1	K	5% 1/4 W	OHMITE	RC07GF512J
R234	000221	RES	CARBON	220	OHM	5% 1/4 W	OHMITE	RC07GF221J
R235	000103	RES	CARBON	10	K	5% 1/4 W	OHMITE	RC07GF103J
R236	000330	RES	CARBON	33	K	5% 1/4 W	OHMITE	RC07GF330J
R237	000330	RES	CARBON	33	K	5% 1/4 W	OHMITE	RC07GF330J
R238	000392	RES	CARBON	0003.9	K	5% 1/4 W	OHMITE	RC07GF392J

P A R T S L I S T

REF DES	DANA P/N	PART	TYPE	DESCRIPTION	MANUFAC	MANUFAC P/N
PCB ASSEMBLY P/N 400206 FILTER AC CONVERTER						
C301	110005	CAP	TANTA	10 MFD 50 V 10%	SEMCOR	TSW1K-50-106
C302	110005	CAP	TANTA	10 MFD 50 V 10%	SEMCOR	TSW1K-50-106
C303	120016	CAP	MYLAR	5 MFD 100 V 10%	IMB	XA1133K
C305	120016	CAP	MYLAR	5 MFD 100 V 10%	IMB	XA1133K
C306	111097	CAP	ELECT	50 MFD 50 V 20%	SPRAGUE	TE1307
C307	120012	CAP	MYLAR	1 MFD 200 V %	IMB	XAZC105J
Q301	200040	TRANS	SILICO NPN	016	DANA	200040
Q302 THRU Q308	200043	TRANS	SILICO NPN	2N3565	FAIRCHILD	2N3565
Q309	200022	TRANS	SILICO PNP	012	DANA	200022
R301	020038	RES	WW	4 K .05% 1/4 W	JORDAN	J-12
R302	020038	RES	WW	4 K .05% 1/4 W	JORDAN	J-12
R303	020038	RES	WW	4 K .05% 1/4 W	JORDAN	J-12
R304	020038	RES	WW	4 K .05% 1/4 W	JORDAN	J-12
R305	020037	RES	WW	40 K .05% 1/4 W	KELVIN	EP-21
R306	020037	RES	WW	40 K .05% 1/4 W	KELVIN	EP-21
R307	021244	RES	WW	47.5 K 0.1% 1/4 W	JORDAN	J-12
R308	040005	RES	VARI	10 K 10% 1/2 W	BOURNS	3067-P-1-103
R309	021244	RES	WW	47.5 K 0.1% 1/4 W	JORDAN	J-12
R310	000242	RES	CARBON	2.4 K 5% 1/4 W	OHMITE	RC07GF242J
R311	000133	RES	CARBON	13 K 5% 1/4 W	OHMITE	RC07GF133J
R312	010027	RES	METAL	499 OHM 1% 1/4 W	ELECTRA	RN60D4990F
R313	010287	RES	METAL	3.01 K 1% 1/4 W	ELECTRA	RN60D3011F
R314	000133	RES	CARBON	13 K 5% 1/4 W	OHMITE	RC07GF133J
R315	000561	RES	CARBON	560 OHM 5% 1/4 W	OHMITE	RC07GF561J
R316	000683	RES	CARBON	68 K 5% 1/4 W	OHMITE	RC07GF683J
R317	000102	RES	CARBON	1 K 5% 1/4 W	OHMITE	RC07GF102J
R318	000683	RES	CARBON	68 K 5% 1/4 W	OHMITE	RC07GF683J
R319	000392	RES	CARBON	0003.9 K 5% 1/4 W	OHMITE	RC07GF392J
R320	000102	RES	CARBON	1 K 5% 1/4 W	OHMITE	RC07GF102J
R321	000102	RES	CARBON	1 K 5% 1/4 W	OHMITE	RC07GF102J
R322	000752	RES	CARBON	7.5 K 5% 1/4 W	OHMITE	RC07GF752J
R323	000241	RES	CARBON	240 OHM 5% 1/4 W	OHMITE	RC07GF241J
R324	000823	RES	CARBON	82 K 5% 1/4 W	OHMITE	RC07GF823J

Series 5600 DVM
Plug-In Accessories

Model 50, 55 and 58 Filters are adaptable to all Series 5600 instruments, reject line-frequency hum and all higher frequency noise superimposed on dc signals. Three models allow choice of rejection and setting times.

Model 20, 24 and 25 AC Converters convert ac voltages into proportional dc voltages, which are then measured by the DVM circuitry and displayed in rms voltage values. Models 24 and 25 have a bandwidth of 100 kHz; Model 20, a bandwidth of 20 kHz. Model 24 has programmable settling time.

Model 02 Ohms Converter translates dc resistances into dc voltages, which are then measured by the Series 5600 instrument and displayed as kilohms. Range selection and decimal point display are automatic.

Model 11 and 12 Preamplifiers increase the sensitivity of Series 5600 instruments by amplifying small dc signals. Resulting resolution on the lowest range is 0.1 microvolt. Readout is in millivolts, with automatic placement of decimal point. Range selection is automatic or manual, at operator's option.

Model 47 and 48 Digital Output accessories convert DVM output into a coded signal for operating devices such as printers, recorders and computers. Code is BCD (or 10-line on special order), depending on accessory. Read-command input is included.

MP MASTER
MA29028